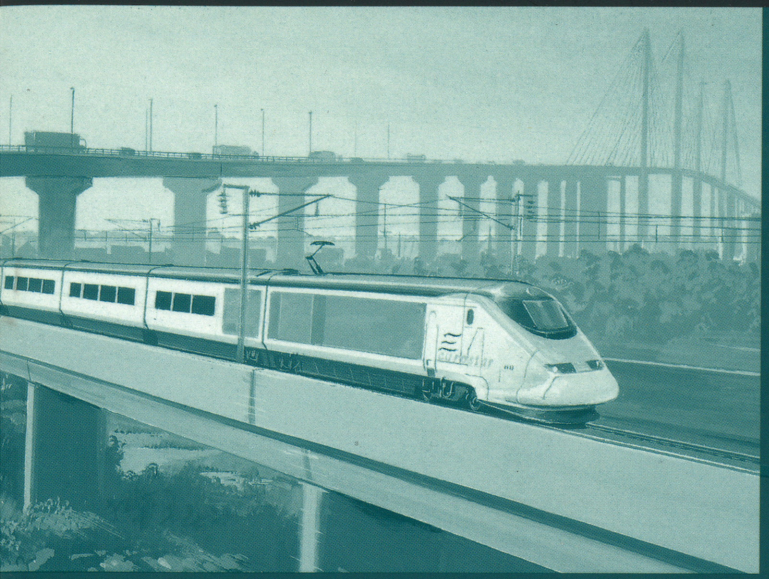

the channel tunnel rail link

OCTOBER 1994

union
RAILWAYS

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London

Brussels

Paris

The Channel Tunnel Rail Link will bring Paris within 2 1/2 hours of London and Brussels within 2hr 10min

Introduction

Eurostar international high-speed train

The Channel Tunnel Rail Link

The Channel Tunnel Rail Link will be a new 68-mile (108km) railway between London and the Channel Tunnel near Folkestone.

The new railway has three main objectives:

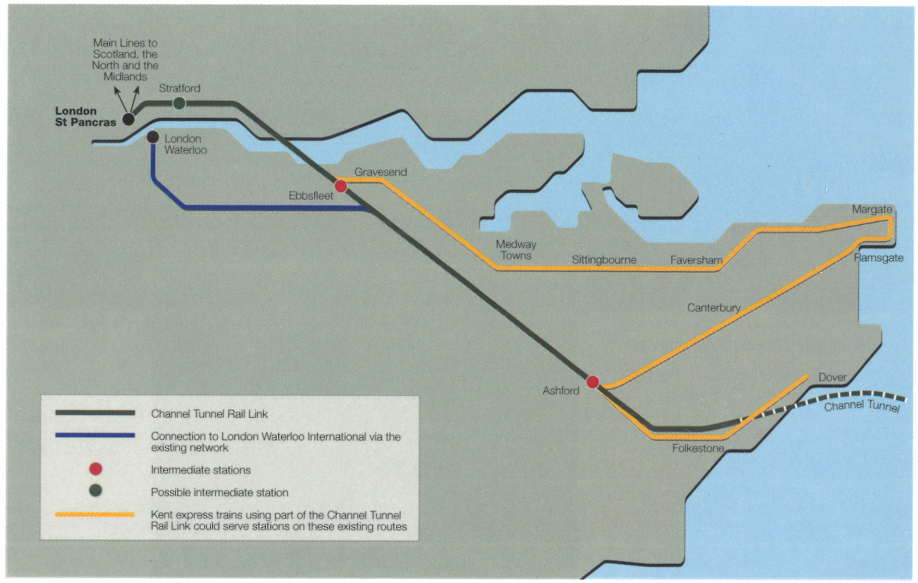
- **To provide capacity needed for growing international rail business via the Channel Tunnel, and to reduce international journey times**
- **To bring major improvements in capacity, journey time and quality for rail services between London and north and east Kent**
- **To support economic regeneration and business development**

The Channel Tunnel Rail Link's London terminal will be in a refurbished and extended St Pancras station. There will be intermediate stations in east Kent at Ashford, and in north Kent at Ebbsfleet, with another possible station at Stratford, east London. A connecting line has been designed to enable international trains to reach Waterloo International Terminal by leaving the Rail Link near Gravesend.

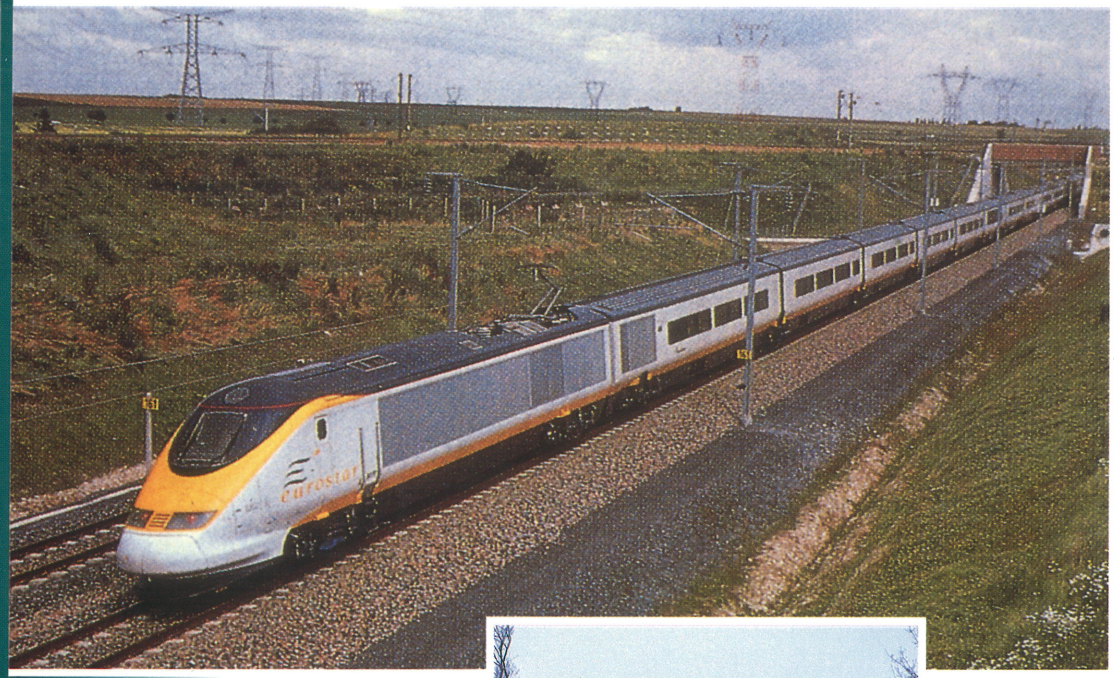
The new railway will have connections at St Pancras with main railways to the North. In Kent, junctions will link the new railway with the existing network, for fast trains between London and north and east Kent.

The route of the new railway has been chosen by the Government from route and design options developed by Union Railways Limited, a British Rail agency company. The development and choice of options was guided by detailed analysis of effects on people and the environment, and extensive consultation was carried out in the areas affected.

The Government will seek authority from Parliament for the construction of the new railway. This booklet gives information about these proposals, how they were arrived at, and about the Parliamentary Bill procedure. It also gives information about the proposals for the design and construction of the new railway, which are to be carried out by a private-sector group.



Benefits of the Channel Tunnel Rail Link



Eurostar international train on high-speed line in France

Capacity for growing international rail traffic

The Channel Tunnel Rail Link is needed to increase the capacity of the railway network for trains to and from the Channel Tunnel. On current forecasts, the existing railway capacity is expected to approach saturation early in the new century, as international passenger travel and freight traffic grow.

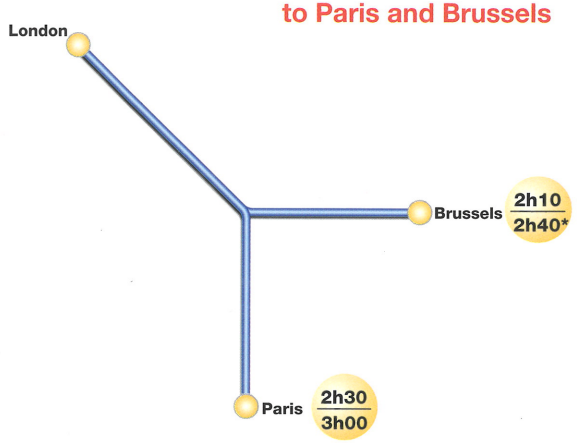
International travel - speed, capacity and quality

The Channel Tunnel Rail Link will more than double the capacity available for international passenger services between London and continental Europe, and it will reduce journey times - 30 minutes will be saved on journeys between London and Paris or Brussels. The purpose-built high-speed railway will provide high standards of reliability and comfort for international travel.

The Channel Tunnel Rail Link will knit the UK into the European High-Speed Rail Network - bringing to the UK the benefits of high-speed railways, which are already established as successful competitors with air and road transport elsewhere in Europe.

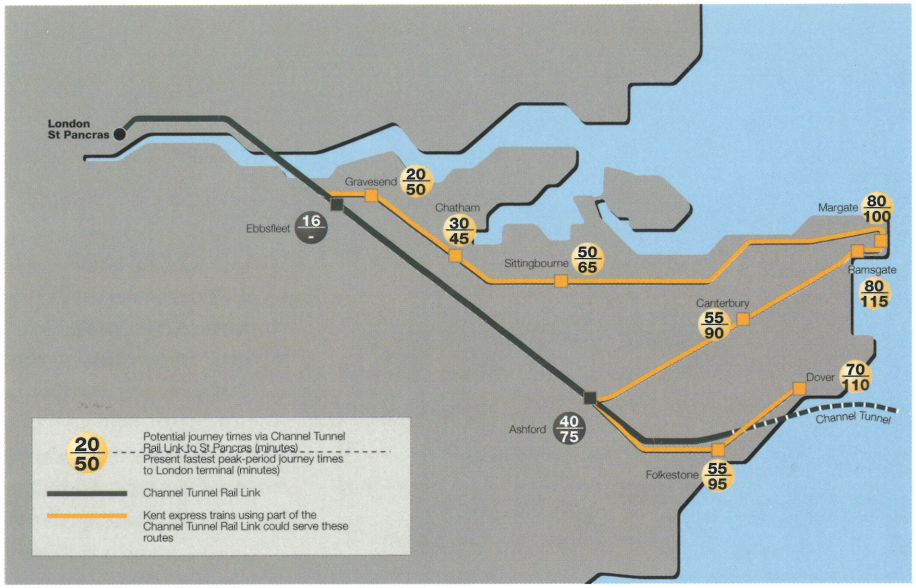
Pressure on the existing railways of Kent will be relieved by the Channel Tunnel Rail Link

Time savings - London to Paris and Brussels



* 3h15 until opening of high speed line in Belgium

Kent to/from London - Potential express journey time savings


London St Pancras
Gravesend 20 50
Ebbsfleet 16 -
Chatham 30 45
Sittingbourne 50 65
Margate 80 100
Ramsgate 80 115
Canterbury 55 90
Dover 70 110
Channel Tunnel
Ashford 40 75
Folkestone 55 95
20 50
Potential journey times via Channel Tunnel Rail Link to St Pancras (minutes)
Present fastest peak-period journey times to London terminal (minutes)
Channel Tunnel Rail Link
Kent express trains using part of the Channel Tunnel Rail Link could serve these routes

A new rail artery for domestic travel

The Channel Tunnel Rail Link's transport benefits will not be limited to international travellers. Up to 12 fast, high-quality services will be able to run each hour in each direction between London and Kent, transforming standards of speed and reliability.

Kent express trains will be able to use the Channel Tunnel Rail Link, as well as international trains

As well as the stations on the new railway at Ashford and Ebbsfleet, Kent express trains could serve stations over a much wider area. Trains would use the new railway for rapid journeys to and from London, but they could reach further into north and east Kent, by using two new junctions between the Rail Link and the existing railways.

The new railway will also bring improvements to other train services in the area. Congestion on the existing railways will be eased and reliability improved by the transfer of international services and fast domestic trains to the Channel Tunnel Rail Link.

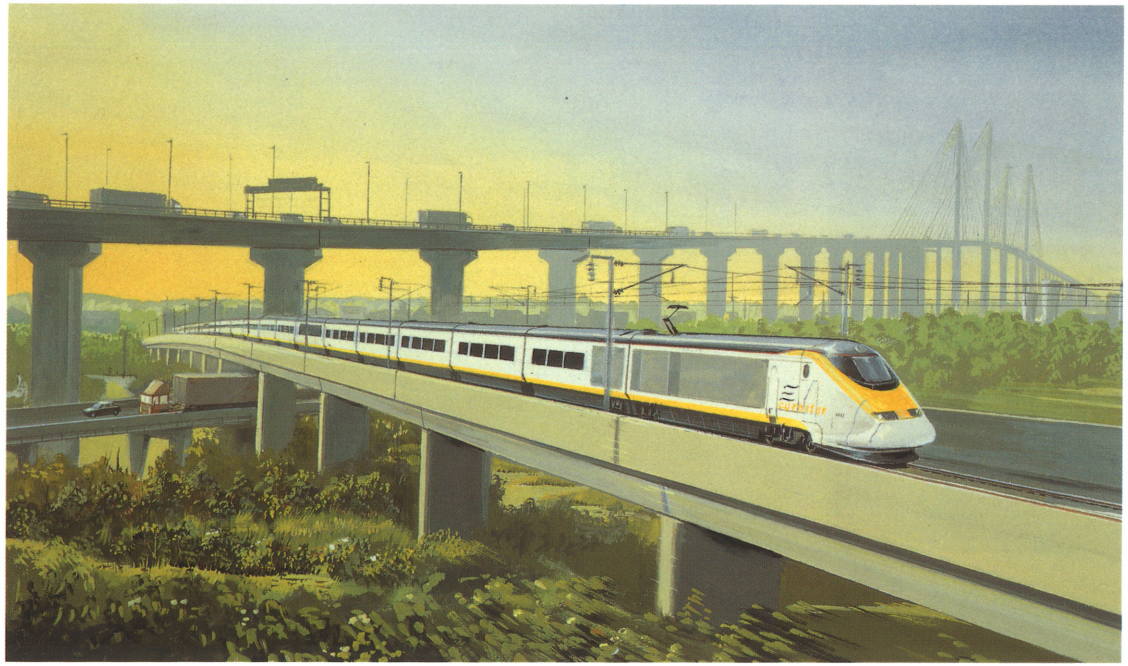
The possible station on the new railway at Stratford could provide an alternative London focus for travel to and from Kent.

Beyond London

St Pancras station will have railway links to the East and West Coast Main Lines for international trains beyond London.

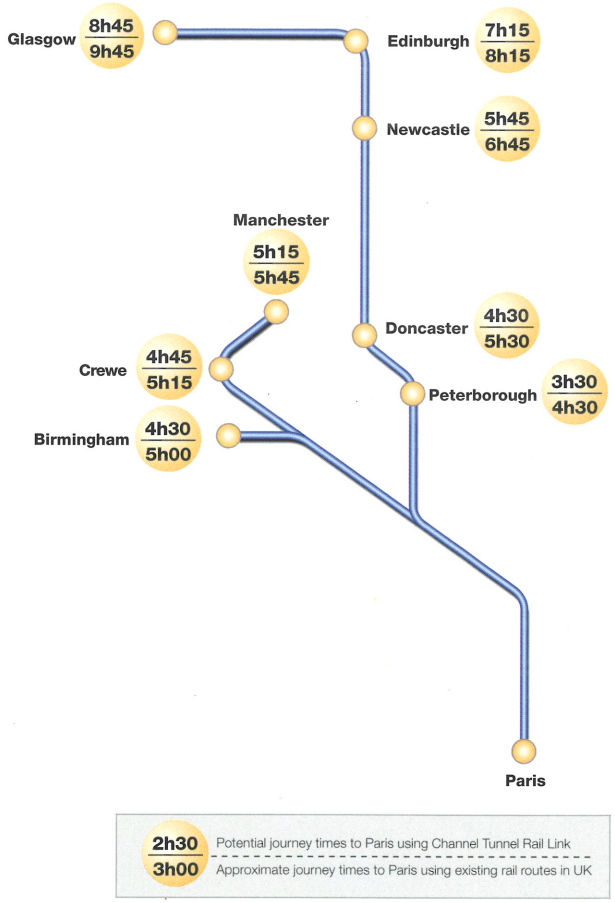
St Pancras will offer quick and easy transfer between the Rail Link and InterCity rail services at both St Pancras and Kings Cross - serving the Midlands and North-East of England, and Scotland. Nearby Euston has rail services to and from the West Midlands and North-West of England, North and Mid Wales, and Scotland.

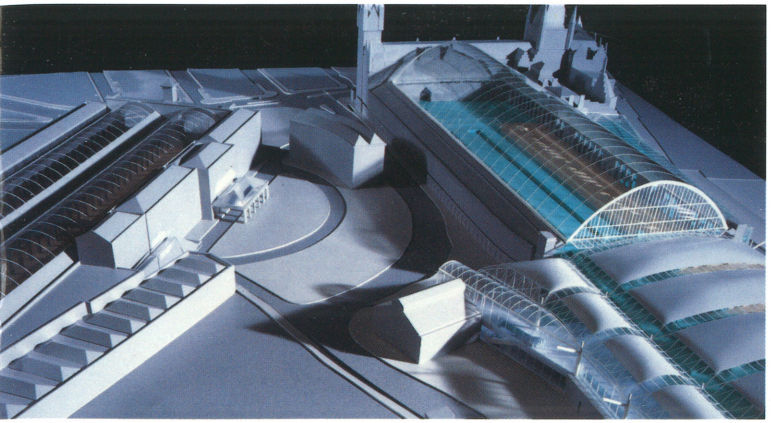
London's first international station, at Waterloo, is an alternative focus for international travel, on the south side of central London, with convenient railway connections serving the south and west of the country.



An artist's impression of a Eurostar international train en route to London, having just passed under the Thames in tunnel from Kent to Essex

Direct trains to Paris - Potential time savings


Glasgow 8h45 9h45
Edinburgh 7h15 8h15
Newcastle 5h45 6h45
Manchester 5h15 5h45
Doncaster 4h30 5h30
Crewe 4h45 5h15
Peterborough 3h30 4h30
Birmingham 4h30 5h00
Paris
2h30 3h00
Potential journey times to Paris using Channel Tunnel Rail Link
Approximate journey times to Paris using existing rail routes in UK



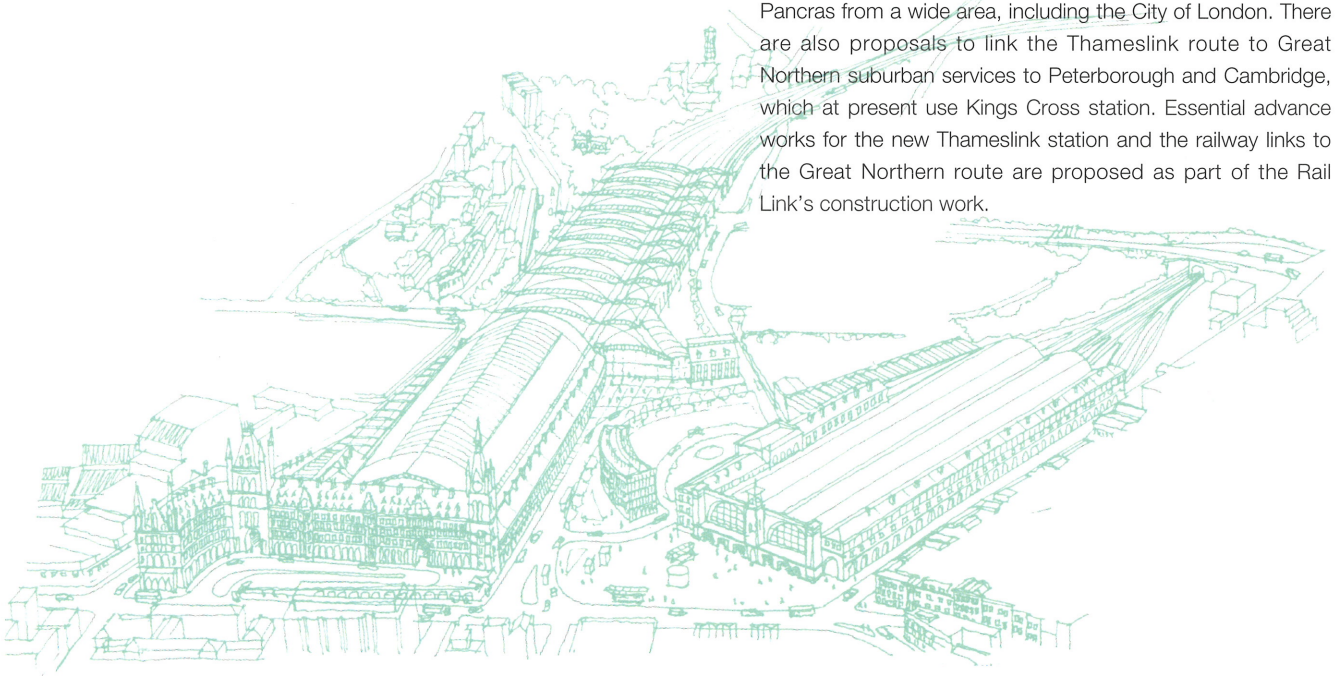
Impressions of London St Pancras terminal of Channel Tunnel Rail Link

St Pancras - focus for International, InterCity and South-East rail travel

The Channel Tunnel Rail Link's London terminal will be the Grade-One listed St Pancras station, which will be extended and restored.

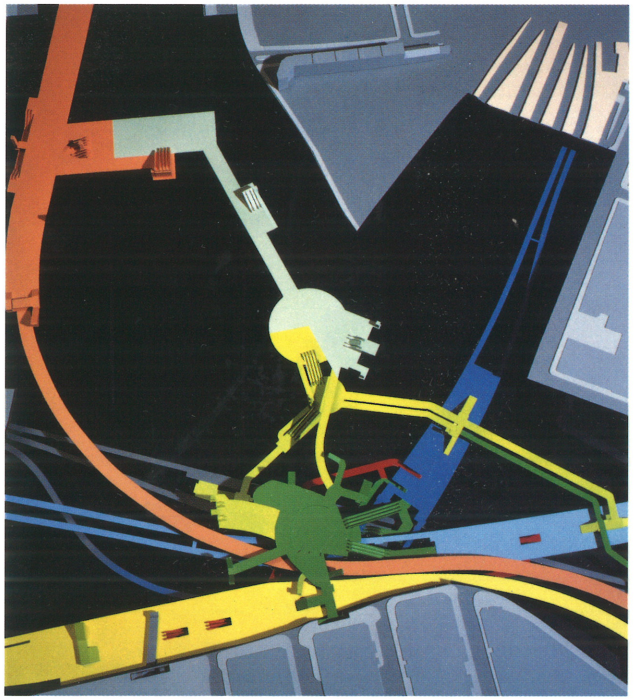
The St Pancras terminus will have platforms for international and Kent express trains using the Channel Tunnel Rail Link, and for the Midland Main Line's InterCity trains. There will be new interchange subways with Kings Cross InterCity station and the Underground.

Close to St Pancras, a new station could be provided for the Thameslink cross-London railway, improving access to St Pancras from a wide area, including the City of London. There are also proposals to link the Thameslink route to Great Northern suburban services to Peterborough and Cambridge, which at present use Kings Cross station. Essential advance works for the new Thameslink station and the railway links to the Great Northern route are proposed as part of the Rail Link's construction work.



St Pancras terminal - Underground and Thameslink connections

- *Possible Thameslink station and route*
- *Kings Cross Main Line station*
- *New Underground ticket hall*
- *Existing Underground ticket hall*
- *Piccadilly Line*
- *Northern Line*
- *Circle Line*
- *Victoria Line*



St Pancras

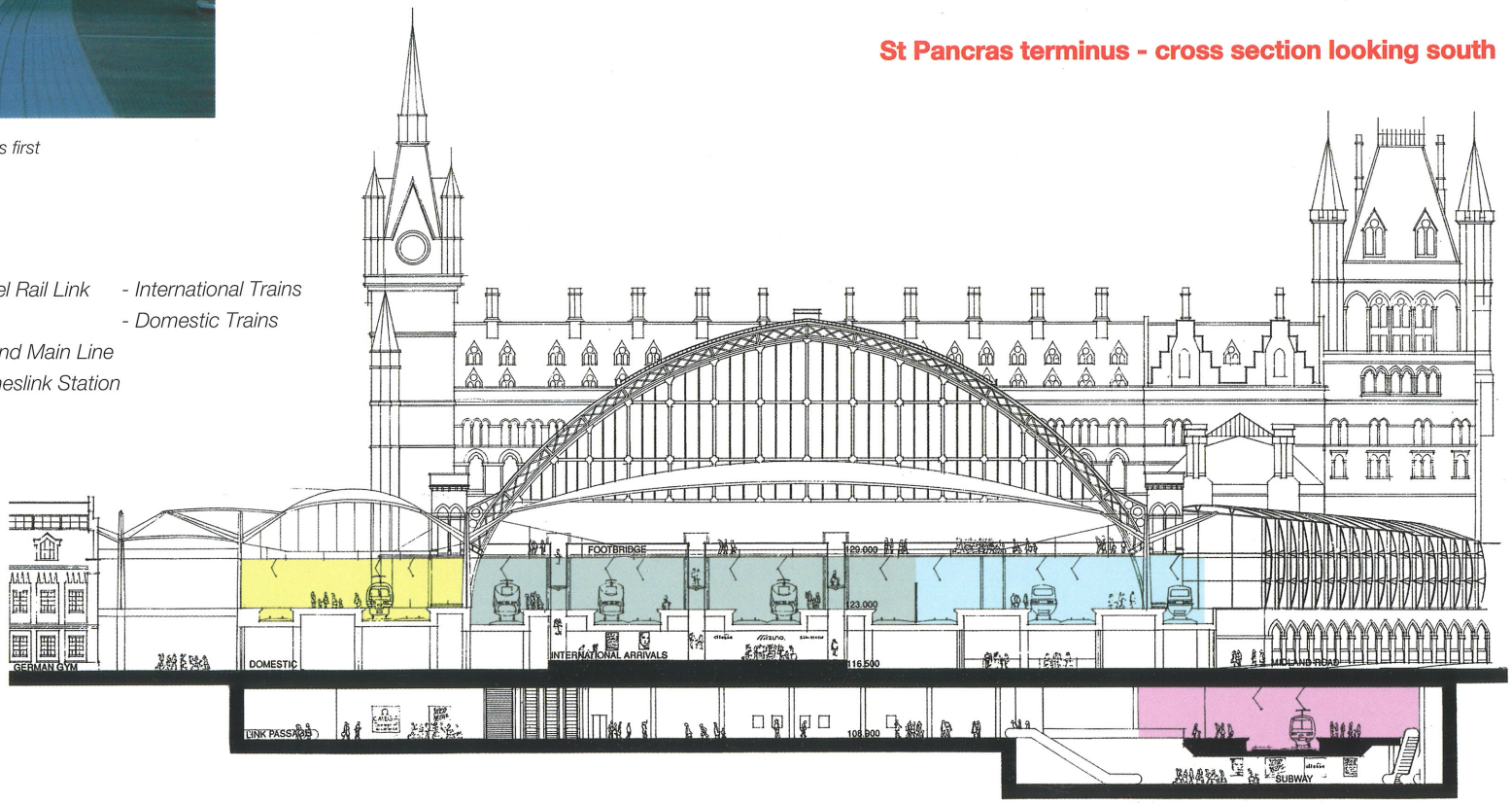
Eurostar international high-speed train at London's first international rail terminal, at Waterloo

New facilities are envisaged for departing international travellers on the west side of St Pancras, and for arriving international travellers on a new concourse beneath the platforms. New subway links, travelators and escalators will be provided for transfer between international and domestic trains and the Underground.

Direct railway links will be provided at St Pancras, so that international trains can use the Channel Tunnel Rail Link to reach the East and West Coast Main Lines.

St Pancras terminus - cross section looking south

- *Channel Tunnel Rail Link - International Trains*
- *- Domestic Trains*
- *InterCity Midland Main Line*
- *Possible Thameslink Station*



Transport support for economic growth

The railway's stations at St Pancras, Ebbsfleet and Ashford will encourage local commercial development. The quality and speed of international and domestic travel for business and leisure will be transformed, offering a stimulus to many sectors of the local economy. Areas which stand to benefit include the "Thames Gateway" area and East Kent. The possibility of another station at Stratford remains open.

London's status as one of the world's great capital cities will be strengthened - the quality and speed of rail travel with the rest of Europe will smooth the way for business and leisure travel. Regeneration of the Kings Cross area will be encouraged by the improved rail services and new international terminal at St Pancras.

The Channel Tunnel Rail Link will help to ensure that railway capacity to the Channel Tunnel is available for the benefit of the whole of the country. The quality, speed and reliability of passenger and freight services for all regions will support the competitiveness of British business, through improved standards for business travel and freight access to markets.

Construction of the new railway - a project costed at about £2.7 billion - will provide a wide variety of work. Some 15,000 jobs are expected to be created in planning, engineering, transport and construction businesses, and in production of construction and railway equipment and materials.

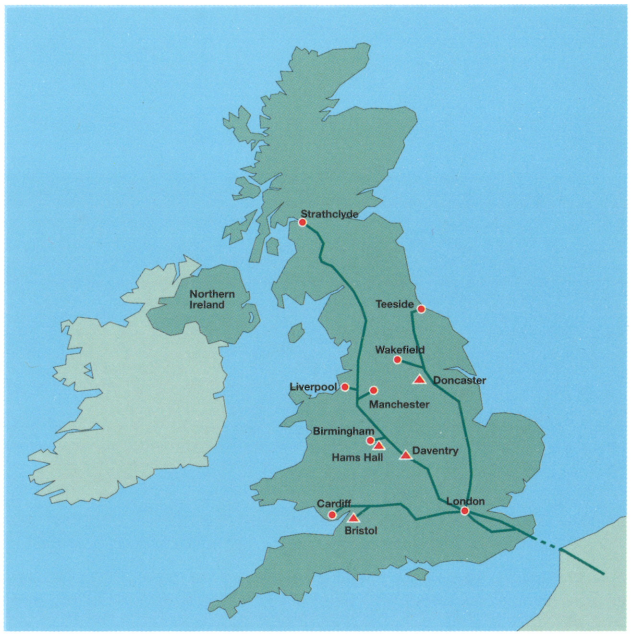
Ebbsfleet, North Kent: regeneration potential in the "Thames Gateway" area

Freight - creating network capacity

The Channel Tunnel Rail Link's major role of taking international and Kent express trains from existing Channel Tunnel rail routes will release capacity on the network to carry other services, including international freight trains serving the whole of the UK.

The Rail Link will be ideally suited for special high-speed trains for fast-delivery freight and parcels. The new railway will also be capable of carrying other international freight trains. If justified by demand for freight trains, additional tracks could be provided at two places in Kent to allow passenger trains to overtake slower freight trains.

Near Dagenham in east London, a junction will link the new railway with the existing rail network.



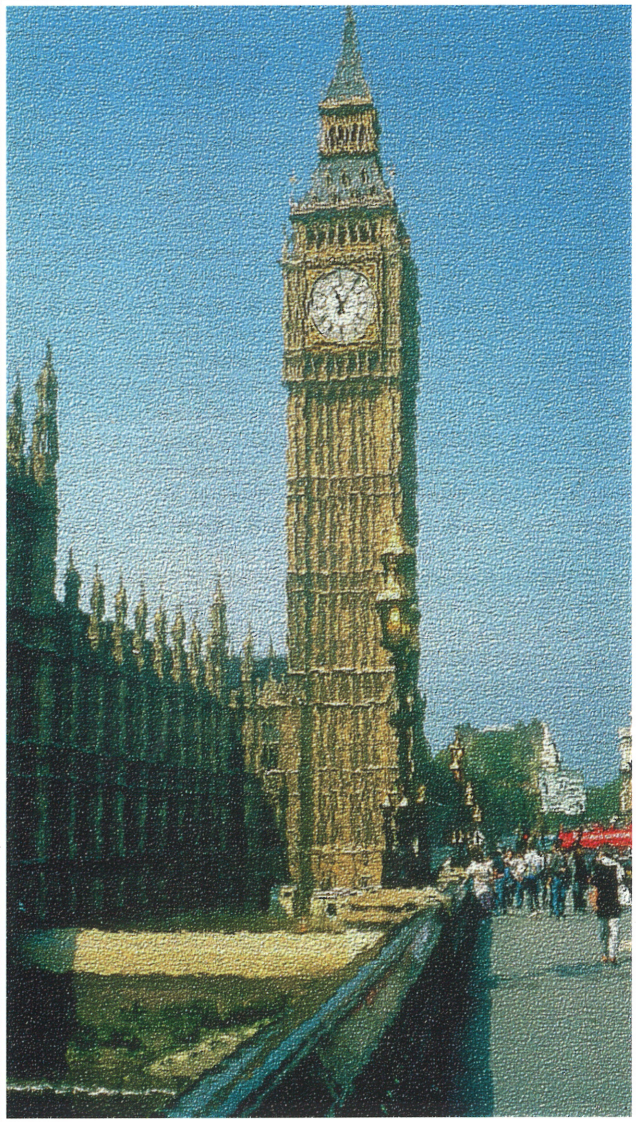
International freight terminals

Existing and proposed

- Regional terminals
- Independent private-sector terminals

New electric locomotives have been built for international freight trains

The Next Steps



Authority from Parliament

The Government will seek authority for the construction and operation of the Channel Tunnel Rail Link by submitting a Bill to Parliament. The Bill's proposals will be closely examined by Select Committees of both Houses of Parliament, and individuals or groups who are materially affected by the Bill can petition these Committees about their concerns.

The timing of the Bill's various stages will be determined in the light of the Parliamentary timetable, and will also depend on how long it takes to hear the views of petitioners. It is currently estimated that Parliament's consideration of the Bill will take between 18 months and two years. If so, main works on the Rail Link are expected to start in early 1997, and to be completed in 2002.

The Bill and supporting material will also include proposals for widening the M2 motorway between Junctions 1 and 4, where the Rail Link will run alongside the motorway. The railway and motorway projects will each require a new high-level bridge across the Medway.

Building the Rail Link

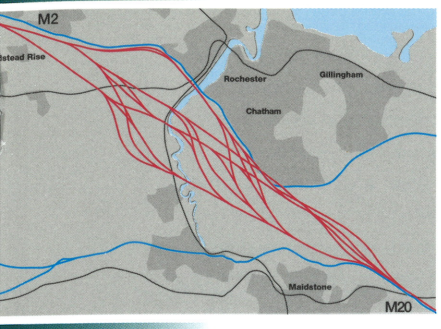
Although the Government will be promoting the Parliamentary Bill for the Channel Tunnel Rail Link, the railway will actually be built by a consortium of private-sector companies, within the terms approved by Parliament.

Tenders have been invited by the Government to enable it to select a private-sector consortium, which will be responsible for the design, construction and maintenance of the new railway, and for a large part of its funding.

An intermediate station is already under construction at Ashford. As soon as it is ready, it will be served by Eurostar services using existing railways, and it will be connected to the Rail Link when it is built. Another intermediate station will be built on the Rail Link at Ebbsfleet in North Kent. A further station at Stratford in east London remains a possibility.

Although the widening of part of the M2 motorway is to be included in the same Parliamentary Bill as the Channel Tunnel Rail Link, the Highways Agency, not the Rail Link consortium, will be responsible for the motorway work.

Route Development and Consultation



Many route options were considered, as here at the Medway Valley

Analysing and choosing route options

The Channel Tunnel Rail Link's route has been developed and refined by Union Railways Limited, whose team was drawn from the public and private sectors, including many leading engineering and environmental consultancies.

An eastern approach route to London was specified by the Government in 1991. Based on this, a large number of route options were identified and compared, to find a route to meet the Rail Link's objectives, including meeting the environmental standards generally applied to major infrastructure projects in the UK. This work resulted in the British Railways Board Report to Government, published in March 1993. For sections of the route where a judgement had to be made between environmental impact and other factors, alternative options were reported, for choice by the Government.

Consultation with those affected

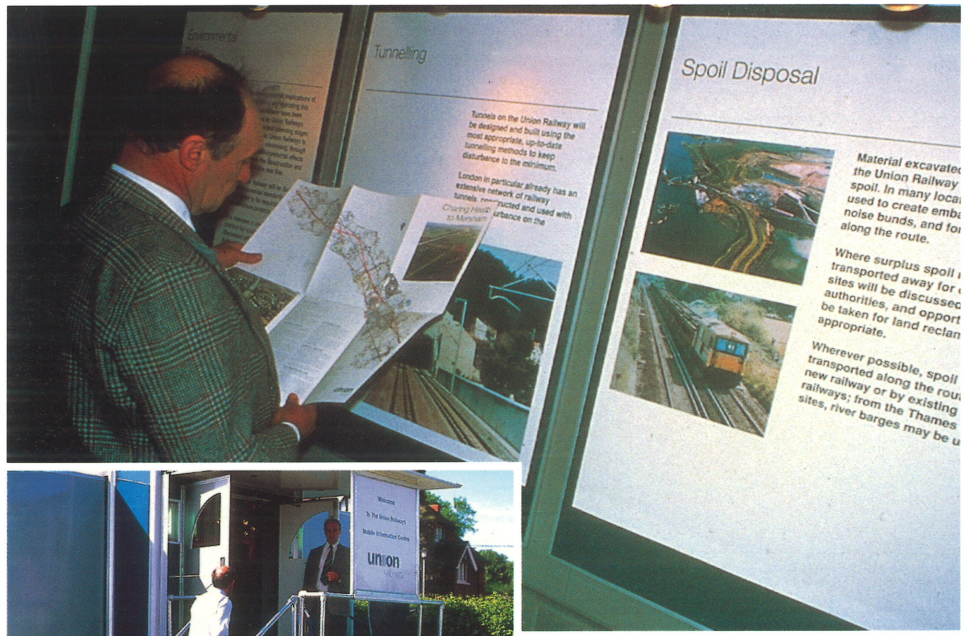
The Government announced its chosen route for consultation in March 1993. In the following six months a major consultation exercise was carried out on this route. This involved members of the public, and a full range of public and private interests, including local and national politicians and statutory bodies, both through formal meetings and at information centres along the route.

The route was refined in the light of consultation, and options for the London terminal, intermediate stations, and additional tunnels were examined. The results of all this work were presented to the Government in a further report in October 1993.

The Government's decisions on the route to be "safeguarded" under planning legislation were announced in January 1994, apart from sections at Ashford and Pepper Hill, where the Government asked for further work to be carried out. These sections were confirmed and safeguarded by June 1994, after further development and consultation.

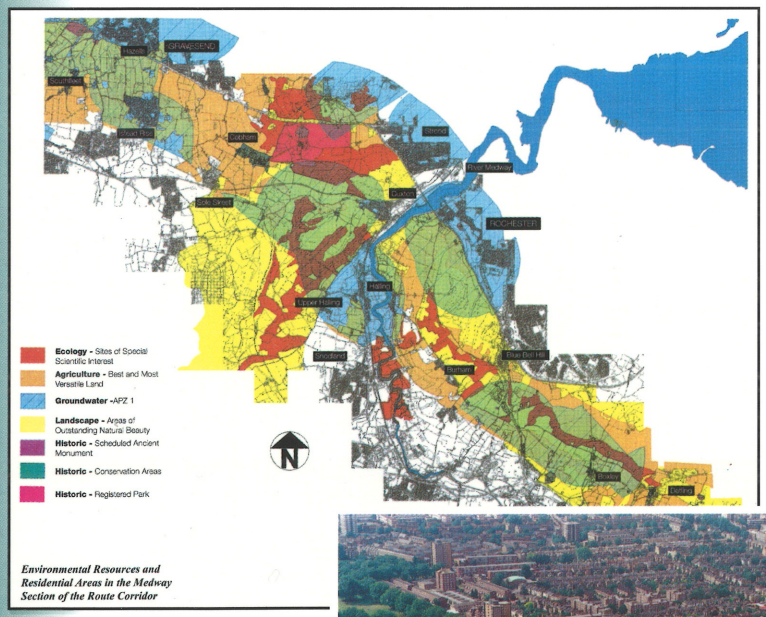
The Rail Link will serve the international and domestic stations at Ashford, by means of connecting lines. In August 1994 the Secretary of State for Transport announced that there will be an intermediate station at Ebbsfleet for international and domestic trains, and that the option of an international and domestic station at Stratford was being kept open.

While there is no need at this stage to acquire property for the construction of the Rail Link, a voluntary purchase scheme was introduced at the time of safeguarding for certain, mainly residential, property on the surface within the safeguarded area.



The route was refined as a result of public consultation

The Environment



Environmental Resources and Residential Areas in the Medway Section of the Route Corridor

Advanced mapping techniques have been used to show human and environmental features

People and the natural environment

A railway between London and the Channel Tunnel will inevitably have effects on people, the local economy and the natural environment.

Information on these effects has been researched and analysed at all stages, first to inform choices between route options, and then to guide and assess the effects of the design of each part of the railway. The research has included consideration of potential effects during the construction period, as well as when the railway is completed and operating.

Where effects on people or the environment cannot be avoided by the choice of route, measures to lessen them have been developed.

Some examples of these measures are:

- short tunnels
- landscaping, including banks or "bunds"
- noise barriers
- archaeological evaluations
- alternative footpath arrangements
- creation of new sites for nature conservation
- a construction code of practice

Hackney, London. Effects on people and the environment have been researched and analysed to guide development of plans for the railway

Concerns expressed during consultation by local people and their representatives have been used to guide work on the design of the railway. Consultation has been maintained with statutory bodies responsible for environmental issues.

Information on the possible effects of the railway has been collected by a team including 14 specialist consultants, and advanced computerised mapping has been used to show human and environmental features and resources of the areas through which the railway will run.

Rainham

Mersham, Kent

Environmental assessment

An assessment of the environmental effects of the railway as now proposed will be submitted to Parliament.

The assessment takes into account proposals developed to lessen the railway's effects. These proposals have been guided by consultation. They include the choice of route, the design of the railway, and the addition of measures specifically to reduce the railway's effects on people and the environment.

The effects on people which are assessed include:

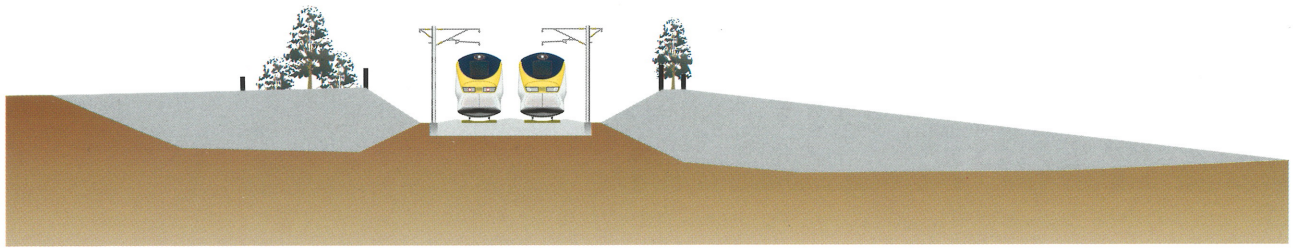
- landtake, including the demolition of homes, workplaces or community facilities
- noise
- disturbance of potentially contaminated land
- visual effects
- construction effects

Ashford, Kent

Noise barriers - as seen here on a viaduct near Tours in France - will be used on the Channel Tunnel Rail Link to reduce noise heard from trains

Resources which are assessed include areas of ecological, landscape, agricultural, archaeological or historic value, and important water resources.

Social and economic factors examined include the local housing market, businesses, employment, and the local authorities' development plans.



Landscaped mounds and barriers can be used to screen the new railway

Construction

Construction of high-speed line in northern France (from top: Fampoux, near Arras; Hénin-Beaumont, near Lille; Oxelaere, near Cassel.)

Construction requirements

To provide the gentle gradients and curves needed for a high-speed railway, it needs to be lowered in cuttings through higher ground, and elevated on embankments across lower ground. Bridges will carry the new railway across or under features such as roads or other railways. About a fifth of the total length of the Channel Tunnel Rail Link will be in tunnel, either to pass under the Thames or high ground, to avoid major disruption in built-up areas, or to provide environmental protection.

The railway will have drainage into existing watercourses. The slopes of cuttings and embankments need to be at an appropriate angle to be stable in the particular ground conditions, or to be supported by walls which retain the slope.

Construction code of practice

The construction of the railway by its promoting company and contractors will be governed by a Construction Code of Practice, developed in consultation with local authorities.

The Code is designed to ensure that all relevant legislative requirements are met, and that satisfactory levels of environmental protection are achieved during construction of the Channel Tunnel Rail Link.

The Code's scope will include:

- consultation and liaison
- movement of construction materials and equipment to/from construction sites
- handling and disposal of excavated material
- safe handling of waste and hazardous material
- control of noise, dust and vibration
- protection of natural resources
- hours of work
- restoration after construction

Tunnelling

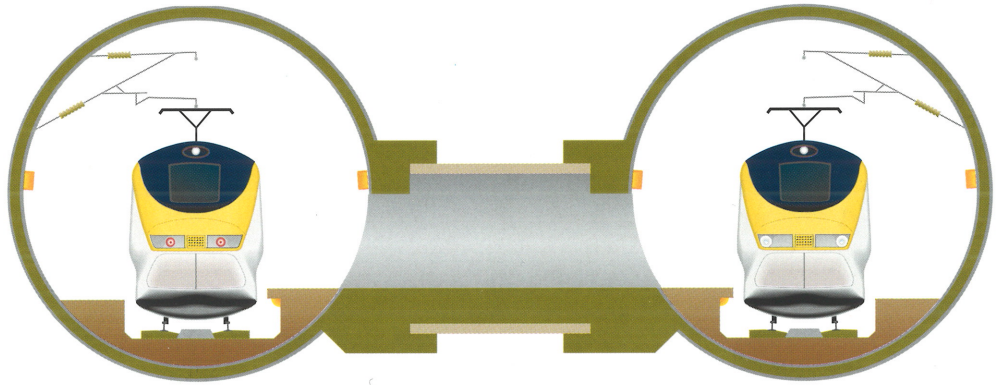
The construction of tunnels on the Channel Tunnel Rail Link will use the most appropriate proven technology for the particular ground conditions.

There are two main methods of deep tunnelling - tunnel boring by machine, or the New Austrian Tunnelling Method.

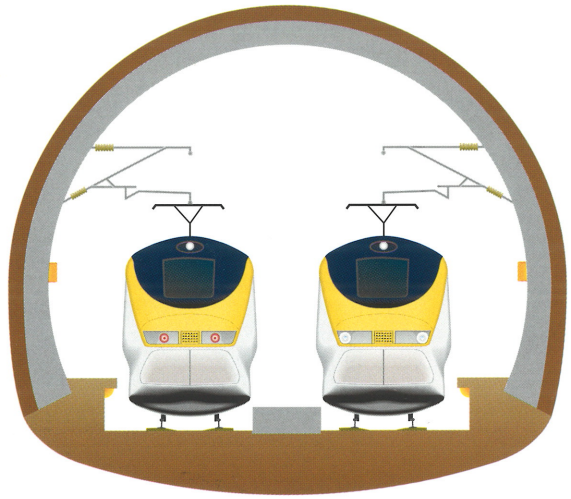
A tunnel boring machine is cylindrical, with a rotary cutting device at its leading end. At the other end is equipment for lining the tunnel with segments of concrete or iron, and for removing excavated material.

The "New Austrian" tunnelling method involves excavation of sections of the tunnel by less complex machinery, and immediate stabilising of the surrounding earth with concrete. This method is used for shorter tunnels in uniform ground.

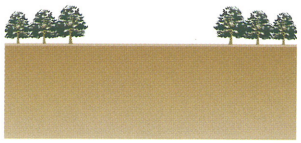
Twin bore - Single track tunnel



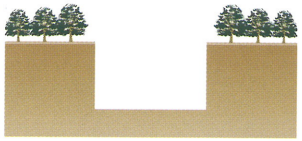
Single bore - Twin track tunnel



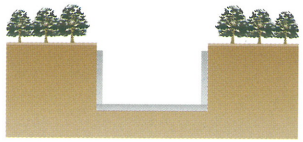
Cut-and-cover tunnel construction



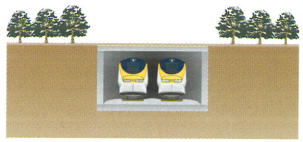
1. Surface clearance



2. Excavation



3. Structural lining



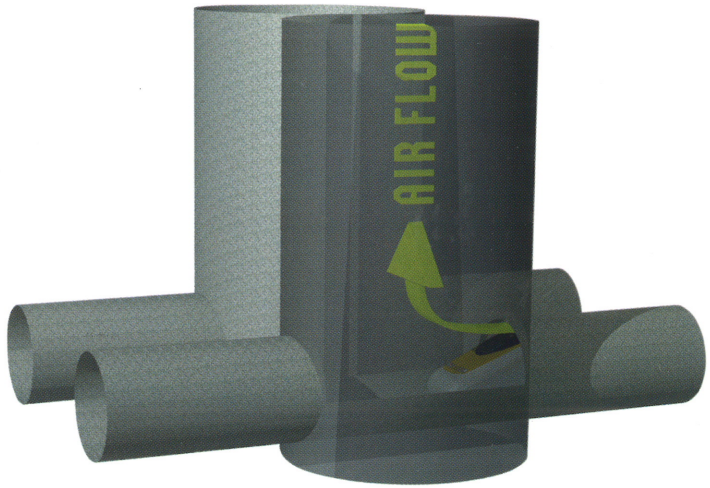
4. Finished tunnel

The long tunnels under London and the Thames are expected to be built by tunnel-boring machines, and are likely to have a separate tunnel for each of the railway's two tracks. The North Downs tunnel is expected to be built as a single large tunnel carrying both tracks.

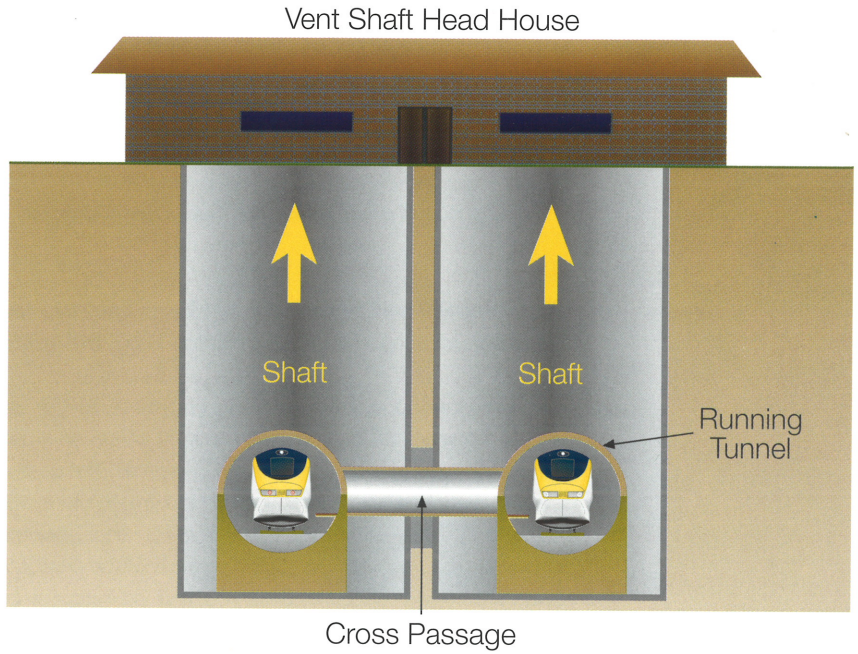
Short sections of tunnel near the surface of the ground can be built by the "cut-and-cover" method. This means excavating the course of the railway from ground level, and then roofing it over. In some cases the roof and walls are built first from ground level, and the tunnel is then excavated beneath.

Advanced methods will be used to predict and minimise disturbance from deep tunnelling. There should be very little or no effect on property above or near tunnels, but any damage caused by tunnelling will be made good. A large part of the tunnel alignment has been kept away from properties on the surface, often by running below existing railways.

For longer tunnels, ventilation and access shafts from the surface are required - for fresh-air ventilation, relief of air-pressure effects from trains, assistance with temperature control within the tunnels, and for possible use as access in an emergency. Ground-level structures will be designed in a style in keeping with their surroundings.



Ventilation shaft design



Running a safe and reliable railway

Safety

The proposals for the Channel Tunnel Rail Link have been subjected to a systematic safety analysis, to confirm that the railway can be operated safely. This work has used state-of-the-art methods, and has been checked by independent experts.

A formal Safety Case has been produced, explaining how the Rail Link project is managed and audited to meet Union Railways' policy aims of reducing risks to as low as reasonably practicable, and meeting all relevant statutory health and safety requirements.

The potential for accidents will be greatly reduced by using modern, high-standard designs for the route and its track, structures, stations and trains. There will be no level crossings, and all tunnels will have evacuation facilities.

Advanced automatic train-control systems will add extra safety. All high-speed junctions will be of a "grade-separated" or flyover type, thus avoiding the need for trains travelling in different directions to cross tracks on the same level.

The design of a safe railway has been a prime objective.

Capacity and reliability

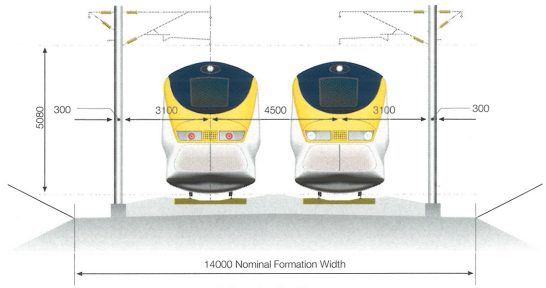
The Channel Tunnel Rail Link will have capacity for international passenger trains, Kent express trains, and freight trains.

Most junctions, including the approach to the St Pancras terminus, are designed with flyovers which will avoid delays from trains moving from one line to another. The quality of track, signalling equipment and other infrastructure will ensure high standards of reliability and safety. Sophisticated monitoring, management and control systems will be provided to help ensure high standards of service, and fast response in emergencies.

Speeds

The Rail Link has been designed for safe operation of trains at speeds of up to 185mph (300km/h) in places. The actual speeds of trains will depend on the mix of different types of train, and the need for a reliable train timetable. It is currently assumed that the maximum timetabled speed will be 140mph (225km/h). If higher speeds were adopted, appropriate additional noise protection measures would be provided. The overall design of the railway is such that, even with faster speeds than currently assumed, trains would be expected to operate mainly at between 90mph (140km/h) and 170mph (275km/h).

Typical cross section of open line



Maintenance depots

International trains using the Channel Tunnel Rail Link are initially expected to use the train depot at North Pole, in west London, which can be reached from St Pancras. As the number of trains increases, new facilities may be needed for parking trains for daily checks, or major maintenance work. It is expected that these facilities would be established on the extensive existing railway lands at Temple Mills, north of Stratford.

A base for maintenance of the new railway's track and other infrastructure is planned at Swanscombe.

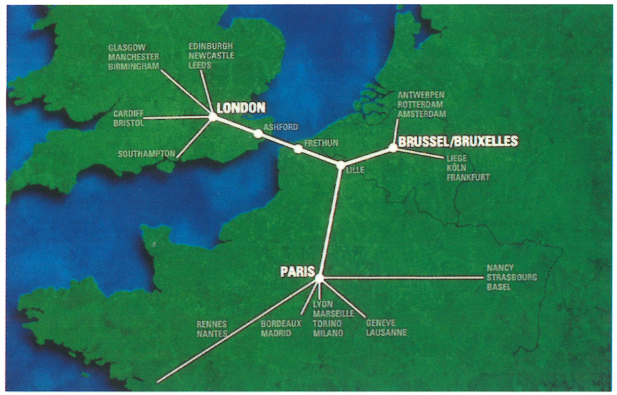
Power supply

The Rail Link's trains will be electrically powered. Electricity will be taken from the National Grid and supplied to trains through electrical equipment beside the line, and overhead wires.

The Channel Tunnel

The Channel Tunnel will be used by several different train services, which are expected to be introduced during 1994 and 1995:

- "Le Shuttle", carrying cars, coaches, lorries and cycles between terminals near Folkestone and Calais
- Direct "Eurostar" high-speed passenger trains, from London and Ashford to Lille, Paris and Brussels, with some trains direct from places north of London
- Overnight passenger trains, direct between a range of destinations in the UK and France, Belgium, Germany and the Netherlands
- Direct freight trains between terminals in the UK and continental Europe



. . . and the Channel Tunnel Rail Link

The Channel Tunnel Rail Link is designed to provide the capacity required for growing demand for direct passenger and freight train services using the Channel Tunnel. The Rail Link will also cut journey times - London to Paris will take 2hr 30min using the Rail Link, compared with three hours using existing railways in the UK.

High-speed railways in other countries are established as successful competitors with air and road transport. The Channel Tunnel Rail Link is a major missing link in the European High-Speed Rail Network.

The studies associated with the Channel Tunnel Rail Link have been partly funded by the European Union through the Transport Infrastructure and Trans European Networks Programmes

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